ROBERTS GORDON

EP-300 Series

Installation, Operation & Service Manual

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the Installation, Operation and Service Manual thoroughly before installing or servicing this equipment.

Installation must be done by a contractor qualified in the installation and service of gas-fired heating equipment or your gas supplier.

Installer

Please take the time to read and understand these instructions prior to any installation. Installer must give a copy of this manual to the owner.

Owner

Keep this manual in a safe place in order to provide your serviceman with necessary information.

Roberts-Gordon LLC
1250 William Street
P.O. Box 44
Buffalo, New York 14240-0044
Telephone: +1.716.852.4400
Fax: +1.716.852.0854
Toll Free: 800.828.7450
www.rg-inc.com
www.corayvac.com
www.radiantheaters.com
www.greenhouse-heater.com
www.robertsgordon.com

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TABLE OF CONTENTS

SECTION 1: Heating System Safety 1
1.1 Manpower Requirements 1
1.2 Safety Labels and Their Placement 1
1.3 California Proposition 65 1
SECTION 2: Installer Responsibility.....3
2.1 Corrosive Chemicals.....3
2.2 National Standards and Applicable Codes 3
SECTION 3: Unpacking the Pump 4
3.1 Open Shipping Cartons 4
SECTION 4: Major Components 5
4.1 Standard Parts List 6
SECTION 5: Pump Installation 10
5.1 Pump Assembly Instructions 10
5.2 Pump Impeller Rotation 11
SECTION 6: Pressure Switch Mounting and Wiring.....14
6.1 Pressure Switch Installation.....14
SECTION 7: Pump Mounting Instructions 15
7.1 Mounting Platform 15
SECTION 8: Motor Wiring.....16
8.1 Impeller Rotation Direction 16
8.2 EP-301 Wiring 16
8.3 EP-303 Wiring.....17
SECTION 9: Venting.....19
9.1 Venting.....19
9.2 Venting the Pump 19
9.3 Vent Material Recomendations.....19
9.4 Horizontal Venting.....19
9.5 Vertical Venting.....20
9.6 Venting Accessories 20
9.7 Condensate Tee Assembly 21
9.8 Condensate Trap and Condensate Tee 23
SECTION 10: Servicing Instructions 26
10.1 Pre-Season Maintenance and Annual Inspection 26
10.2 To Change the Motor and/or the Impeller 26
10.3 Maintenance Checklist.....28
SECTION 11: Replacement Parts and Accessories 29
11.1 Replacement Parts 29
11.2 Accessories 30
SECTION 12: Specifications.....31
12.1 Material Specifications.....31
12.2 EP-301 Controls Specifications 31
12.3 EP-303 Controls Specifications 31
12.4 General Dimension Specifications 31
12.5 Pump Specifications..... 31
SECTION 13: The ROBERTS GORDON® EP-300 Series Pump Warranty..... 33

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TABLE OF FIGURES

Figure 1: Label Placement 2
Figure 2: Major Component Descriptions 5
Figure 3: Pump Discharge Orientation 10
Figure 4: Installation Configurations 11
Figure 5: Pump Impeller Rotation 12
Figure 6: Pump Inlet Side 4" 12
Figure 7: Pump Inlet Side 6" 13
Figure 8: Pump Discharge Side 13
Figure 9: Pressure Switch Mounting Hole Location 14
Figure 10: Mounted Pressure Switch 14
Figure 11: Wiring - Pump Pressure Switch ONLY 14
Figure 12: Wall Bracket Assembly 15
Figure 13: Mounting Platform Options 15
Figure 14: EP-301 Contactor Wiring Diagram 16
Figure 15: Motor Wiring for EP-301 Pump (Clockwise Impeller Rotation) 17
Figure 16: EP-303 208 V - 230 V (or 460 V) 3 Ø Pump Starter Wiring Diagram 17
Figure 17: Motor Wiring for EP-303 (208 V - 230 V/460 V) 3 Ø Pump 18
Figure 18: Horizontal Venting 20
Figure 19: Vertical Venting 21
Figure 20: Condensate Tee Assembly at Pump Inlet 22
Figure 21: Condensate Drain for Vertical Venting 22
Figure 22: Condensate Check Valve 23
Figure 23: Condensate Tee - Discharge Side 23
Figure 24: Condensate Neutralization Tube 25

LIST OF TABLES

Table 1: EP-301 Pump Package 4" (P/N 02723014) 6
Table 2: EP-301 Pump Package 6" (P/N 02723016) 7
Table 3: EP-303 Pump Package 4" (P/N 02723034) 8
Table 4: EP-303 Pump Package 6" (P/N 02723036) 9

LIST OF TABLES

Table 1: EP-301 Pump Package 4" (P/N 02723014)..... 6
Table 2: EP-301 Pump Package 6" (P/N 02723016)..... 7
Table 3: EP-303 Pump Package 4" (P/N 02723034)..... 8
Table 4: EP-303 Pump Package 6" (P/N 02723036)..... 9

SECTION 1: HEATING SYSTEM SAFETY

Your Safety is Important to Us! This symbol is used throughout the manual to notify you of possible fire, electrical or burn hazards. Please pay special attention when reading and following the warnings in these sections.

Installation, service and annual inspection of heater and pump must be done by a contractor qualified in the installation and service of gas-fired heating equipment.

Read this manual carefully before installation, operation or service of this equipment.

This heating system is designed for heating nonresidential indoor spaces. Do not install in residential spaces. These instructions, the layout drawing, local codes and ordinances, and applicable standards that apply to electrical wiring, venting, etc., must be thoroughly understood before proceeding with the installation.

Protective gear is to be worn during installation, operstion and service. Thin sheet metal parts, such as the various venting components, have sharp edges. To prevent injury, the use of work gloves is recommended.

Do not attempt to operate the pump until all steps of the installation have been accomplished.

This pump must be applied and operated under the general concepts of reasonable use and installed using best building practices.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do no play with the appliance.

For additional copies of the Installation, Operation and Service Manual, please contact Roberts-Gordon LLC.

1.1 Manpower Requirements

To prevent personal injury and damage to the pump, two persons will be required for installation.

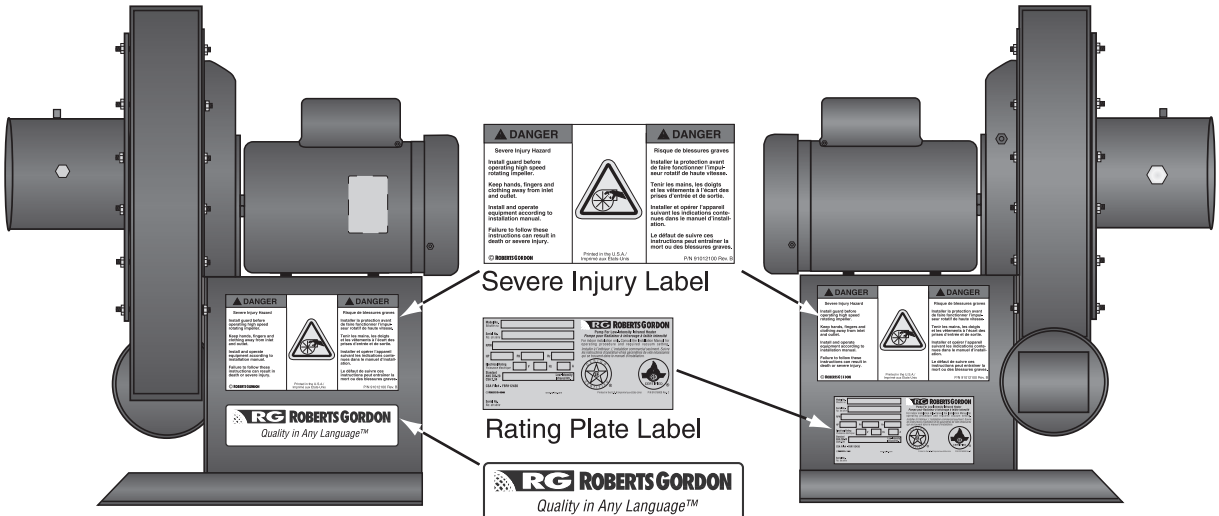
1.2 Safety Labels and Their Placement

Product safety signs or labels should be replaced by the product user when they are no longer legible. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor to obtain replacement signs or labels. *See Page 2, Figure 1*.

1.3 California Proposition 65

In accordance with California Proposition 65 requirements, a warning label must be placed in a highly visible location on the outside of the equipment (i.e., near equipment's serial plate). See the heaters' Installation, Operation and Service Manual for label placement. Avoid placing label on areas with extreme heat, cold, corrosive chemicals or other elements. To order additional labels, please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor.

FIGURE 1: Label Placement



Description	Part Number
Severe Injury Label	91012100
Rating Plate Label	91010401
Logo Label	91017200

SECTION 2: INSTALLER RESPONSIBILITY

The installer is responsible for the following:

- To install the pump and electrical supplies, in accordance with applicable specifications and codes. Roberts-Gordon recommends the installer contact a local building inspector or fire marshal for guidance.
- To use the information given in a layout drawing and in the manual together with the cited codes and regulations to perform the installation.
- To install the heater in accordance with the clearances to combustibles.
- To furnish all needed materials not furnished as standard equipment.
- To plan location of supports.
- To provide access to pump for servicing on all sides and for pump removal.
- To provide the owner with a copy of this installation, operation and service manual.
- To never use pump or pump platform as support for ladder or other access equipment and never hang or suspend anything from pump or pump platform.
- To safely and adequately install pump using materials with a minimal working load of 750 lb (340 kg).
- To ensure the pump is placed in an approved application.

2.1 Corrosive Chemicals

⚠ CAUTION

Product Damage Hazard

Do not use heater in area containing corrosive chemicals.

Refer to appropriate Material Safety Data Sheets (MSDS).

Failure to follow these instructions can result in product damage.

Roberts-Gordon LLC cannot be responsible for ensuring that all appropriate safety measures are undertaken prior to installation; this is entirely the responsibility of the installer. It is essential that the contractor, the sub-contractor, or the owner identifies the presence of combustible materials, corrosive chemicals or halogenated hydrocarbons* anywhere in the premises.

** **Halogenated Hydrocarbons** are a family of chemical compounds characterized by the presence of halogen elements (fluorine, chlorine, bromine, etc.). These compounds are frequently used in refrigerants, cleaning agents, solvents, etc. If these compounds enter the air supply of the burner, the life span of the heater components will be greatly reduced. An outside air supply must be provided to the burners whenever the presence of these compounds is suspected. Warranty will be invalid if the heater is exposed to halogenated hydrocarbons.*

2.2 National Standards and Applicable Codes

All Appliances must be installed in accordance with the latest revision of the applicable standards and national codes. This refers also to the electric, gas and venting installation. Note: Additional standards for installations in Public Garages, Aircraft Hangars, etc. may be applicable.

SECTION 3: UNPACKING THE PUMP

3.1 Open Shipping Cartons

⚠ WARNING

Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

Open cartons and remove packing inserts. Carefully remove pump components from the cartons. Lift assembly by gripping metal pump frame. Two people are required (weight 135 lbs, 61 kg). This pump has been tested prior to packing. The impeller was dynamically balanced before assembly and requires care in handling to avoid damage.

⚠ DANGER

Severe Injury Hazard

Install pump scroll and inlet assembly before operating high speed rotating impeller.

Keep hands, fingers and clothing away from inlet and outlet.

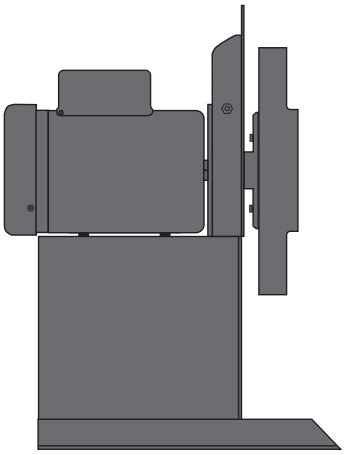
Install and operate equipment according to installation manual.

Failure to follow these instructions can result in death or severe injury.

SECTION 4: MAJOR COMPONENTS

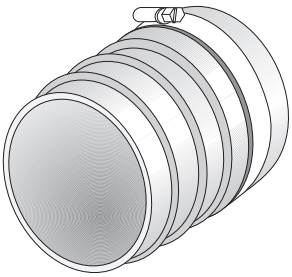
FIGURE 2: Major Component Descriptions

EP-301 Pump Assembly - 02730101
EP-303 Pump Assembly - 02730301

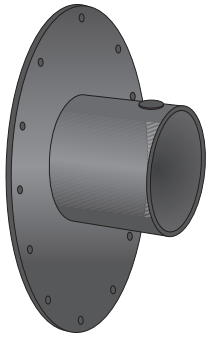


Pump Scroll Assembly - 90713451

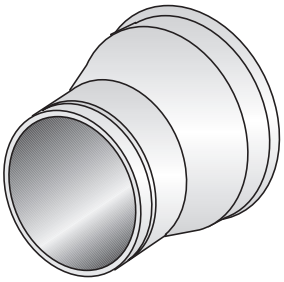
Pump Boot 4" (10 cm) - 91412800
Pump Boot 6" (15 cm) - 91412802



Pump Inlet Assembly - 90713454



4" to 6" (10 cm x 15 cm)
Adapter - 02719903

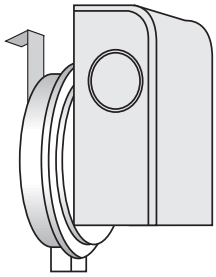


Band Clamp 4" (10 cm) - 91901300
Band Clamp 6" (15 cm) - 91913703

Mounting Angle - 01365000

Bird Screen 6" (15 cm) - 01397400

Pressure Switch - 90430600K



4.1 Standard Parts List

Table 1: EP-301 Pump Package 4" (P/N 02723014)

Part No.	Description	Quantity
	Box 1 of 2	
02730101	**EP-301 Pump Assembly**	1
90713454	Pump Inlet Assembly, 455 mm dia	1
90713451	Pump Scroll Assembly, 529 mm dia	1
01312105	EP-300 Scroll/Inlet Fastener Package	1
	Box 2 of 2	
02730104	**EP-300 Accessory Package 4"**	1
02719903	4" to 6" Adapter	1
90430600K	Pressure Switch Kit	1
90430600	Pressure Switch	1
91417409	Silicone Hose	1
91220201	Barbed Fitting	1
91104001	Locknut	2
94118106	Screw #8 x 3/8	2
96211000	Lock Washer #10	2
93511706	Screw #10-32 x 3/8	2
92311800	Locknut #10-32	2
91412800	Pump Boot (4" x 8")	1
91412802	Pump Boot (6" x 8")	1
91901300	Band Clamp, 4"	2
91913703	Band Clamp, 6"	3
01397400	Bird Screen, 6"	1
01365000	Mounting Angle	6
01311701	**EP-300 Accessory Package**	1
T00680	Isolator Pad	4
93413912	Bolt (5/16 -18 x 3/4)	6
97213920	Bolt (5/16 -18 x 1 1/4)	4
95211600	Flat Washer (5/16)	20
96411600	Lockwasher (5/16)	10
92113900	Hex Nut	10
T0010	Screw #10	3
127202NA	EP-300 Series Installation, Operation and Service Manual	1

Table 2: EP-301 Pump Package 6" (P/N 02723016)

Part No.	Description	Quantity
	Box 1 of 2	
02730101	**EP-301 Pump Assembly**	1
90713454	Pump Inlet Assembly, 455 mm dia	1
90713451	Pump Scroll Assembly, 529 mm dia	1
01312105	EP-300 Scroll/Inlet Fastener Package	1
	Box 2 of 2	
02730106	**EP-300 Accessory Package 6"**	1
90430600K	Pressure Switch Kit	1
90430600	Pressure Switch	1
91417409	Silicone Hose	1
91220201	Barbed Fitting	1
91104001	Locknut	2
94118106	Screw #8 x 3/8	2
96211000	Lock Washer #10	2
93511706	Screw #10-32 x 3/8	2
92311800	Locknut #10-32	2
91412802	Pump Boot (6" x 8")	2
91913703	Band Clamp, 6"	5
01397400	Bird Screen, 6"	1
01365000	Mounting Angle	6
01311701	**EP-300 Accessory Package**	1
T00680	Isolator Pad	4
93413912	Bolt (5/16 -18 x 3/4)	6
97213920	Bolt (5/16 -18 x 1 1/4)	4
95211600	Flat Washer (5/16)	20
96411600	Lockwasher (5/16)	10
92113900	Hex Nut	10
T0010	Screw #10	3
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Table 3: EP-303 Pump Package 4" (P/N 02723034)

Part No.	Description	Quantity
	Box 1 of 2	
02730103	**EP-303 Pump Assembly**	1
90713454	Pump Inlet Assembly, 455 mm dia	1
90713451	Pump Scroll Assembly, 529 mm dia	1
01312105	EP-300 Scroll/Inlet Fastener Package	1
	Box 2 of 2	
02730104	**EP-300 Accessory Package 4"**	1
02719903	4" to 6" Adapter	1
90430600K	Pressure Switch Kit	1
90430600	Pressure Switch	1
91417409	Silicone Hose	1
91220201	Barbed Fitting	1
91104001	Locknut	2
94118106	Screw #8 x 3/8	2
96211000	Lock Washer #10	2
93511706	Screw #10-32 x 3/8	2
92311800	Locknut #10-32	2
91412800	Pump Boot (4" x 8")	1
91412802	Pump Boot (6" x 8")	1
91901300	Band Clamp, 4"	2
91913703	Band Clamp, 6"	3
01397400	Bird Screen, 6"	1
01365000	Mounting Angle	6
01311701	**EP-300 Accessory Package**	1
T00680	Isolator Pad	4
93413912	Bolt (5/16 -18 x 3/4)	6
97213920	Bolt (5/16 -18 x 1 1/4)	4
95211600	Flat Washer (5/16)	20
96411600	Lockwasher (5/16)	10
92113900	Hex Nut	10
T0010	Screw #10	3
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Table 4: EP-303 Pump Package 6" (P/N 02723036)

Part No.	Description	Quantity
	Box 1 of 2	
02730103	**EP-303 Pump Assembly**	1
90713454	Pump Inlet Assembly, 455 mm dia	1
90713451	Pump Scroll Assembly, 529 mm dia	1
01312105	EP-300 Scroll/Inlet Fastener Package	1
	Box 2 of 2	
02730106	**EP-300 Accessory Package 6"**	1
90430600K	Pressure Switch Kit	1
90430600	Pressure Switch	1
91417409	Silicone Hose	1
91220201	Barbed Fitting	1
91104001	Locknut	2
94118106	Screw #8 x 3/8	2
96211000	Lock Washer #10	2
93511706	Screw #10-32 x 3/8	2
92311800	Locknut #10-32	2
91412802	Pump Boot (6" x 8")	2
91913703	Band Clamp, 6"	5
01397400	Bird Screen, 6"	1
01365000	Mounting Angle	6
01311701	**EP-300 Accessory Package**	1
T00680	Isolator Pad	4
93413912	Bolt (5/16 -18 x 3/4)	6
97213920	Bolt (5/16 -18 x 1 1/4)	4
95211600	Flat Washer (5/16)	20
96411600	Lockwasher (5/16)	10
92113900	Hex Nut	10
T0010	Screw #10	3
127202NA	EP-300 Series Installation, Operation and Service Manual	1

SECTION 5: PUMP INSTALLATION

⚠ WARNING

Severe Injury Hazard

Secure pump to tube.

Hang pump with materials with a minimum working load of 750 lbs (340 kg).

Failure to follow these instructions can result in death, injury or property damage.

⚠ WARNING

Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

5.1 Pump Assembly Instructions

5.1.1 Determine Orientation of Pump Discharge

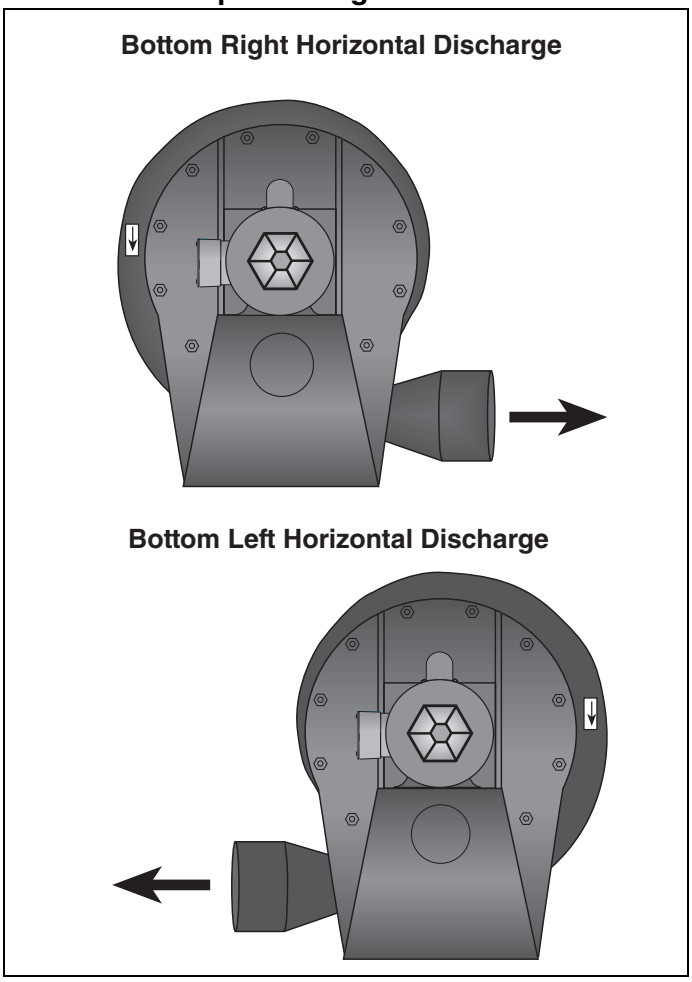
To ensure your safety, and comply with the terms of the warranty, all units must be installed in accordance with these instructions.

The pump must be installed in a location that it is readily accessible for servicing.

An arrow is affixed to the outside of the pump scroll to indicate the direction of rotation of the impeller. The standard rotation of the impeller is in the counterclockwise direction.

Pump discharge orientation is viewed from the rear of the motor as shown in *on Page 10, Figure 3*. Note that the pump scroll outlet must always be positioned at the bottom horizontal position.

FIGURE 3: Pump Discharge Orientation



5.1.2 Attaching Pump Scroll

After determining the correct orientation of the pump scroll outlet, attach the pump scroll to the pump frame as follows:

- In Box 1 of 2, locate the EP-300 Scroll/Inlet fastener package containing hex nuts and washers.
- Place scroll assembly over impeller and align M8 screw studs on the scroll assembly with the holes on the frame. Place the scroll assembly onto the pump frame. Be careful not to damage gasket.
- From the motor side of the vertical mounting plate of the frame, place an M8 washer onto the M8 screw stud. Then thread the M8 hexnut onto the M8 screw stud, finger tighten. Repeat for all 12 screw studs. *See Page 11, Figure 4*.
  NOTE: While tightening the nuts (torque to 132 in/lb) that secure the pump scroll to the pump frame, periodically spin the impeller to be sure

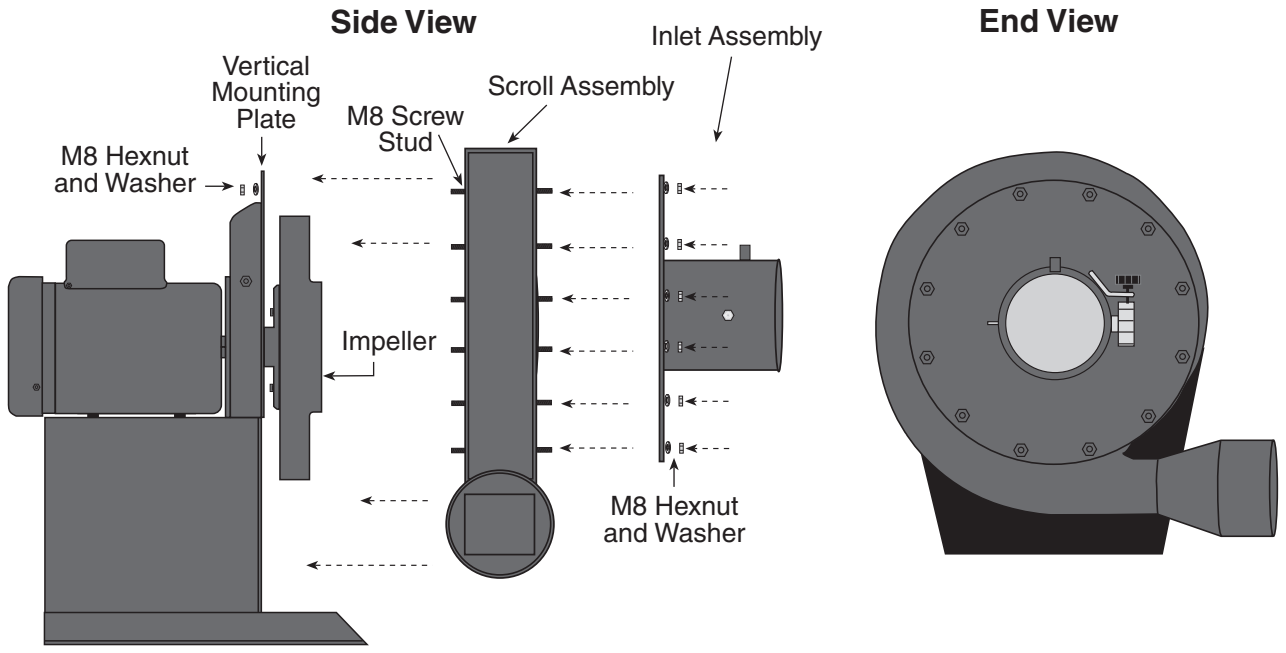
that adequate clearance is maintained between the impeller blades and the body of the pump scroll.

5.1.3 Attaching the Inlet Plate Assembly

From the scroll assembly side of the pump, orient the inlet assembly so the threaded pipe coupling is on the top. See partial end view *on Page 11, Figure 4*.

- Place inlet assembly onto the scroll assembly by fitting the inlet assembly onto the M8 screw studs on the scroll assembly. Be careful not to damage gasket.
- Place M8 washers onto the M8 screw stud. Thread the M8 hex nuts onto the M8 screw studs, finger tighten. Repeat for all 12 screw studs. *See Page 11, Figure 4*.
- Go back and tighten all 24 M8 hex nuts (torque to 132 in/lb) with a wrench to completely secure pump scroll assembly to the pump frame and pump inlet assembly to the pump scroll assembly.

FIGURE 4: Installation Configurations

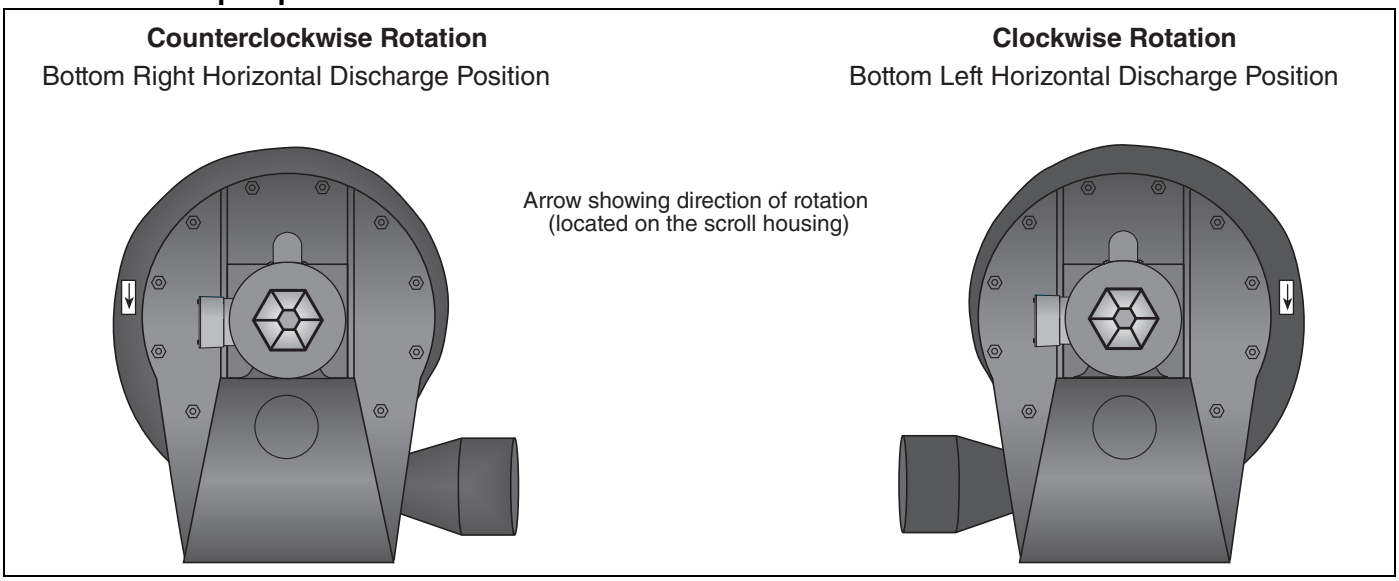


Description	Part Number
Pump Scroll	90713451
Hex Nut, M8 (24)	92204502
Washer, M8 x 16 OD x 1.6	95204502
Impeller	90713340

5.2 Pump Impeller Rotation

The rotation of the impeller, as viewed from behind the motor, must be clockwise when the pump discharge orientation is bottom left horizontal. The rotation of the impeller, as viewed from behind the motor, must be counterclockwise when the pump discharge orientation is bottom right horizontal. An arrow label on the pump scroll indicates the direction of the impeller rotation. To set the rotation direction, *See Page 17, Figure 15 and Page 18, Figure 17* after completing *Section 5*.

FIGURE 5: Pump Impeller Rotation


Counterclockwise Rotation
Bottom Right Horizontal Discharge Position
Clockwise Rotation
Bottom Left Horizontal Discharge Position
Arrow showing direction of rotation
(located on the scroll housing)

5.2.1 Pump Inlet Adapter for 4" (10 cm) Tubing

Apply a bead of silicone sealant (600° F) to the 6" (15 cm) inside of the adapter (6" x 4") (15 cm x 10 cm). Mount the adapter to the inlet of the pump scroll using the 3 - #10 self drilling screws provided. *See Page 12, Figure 6*.

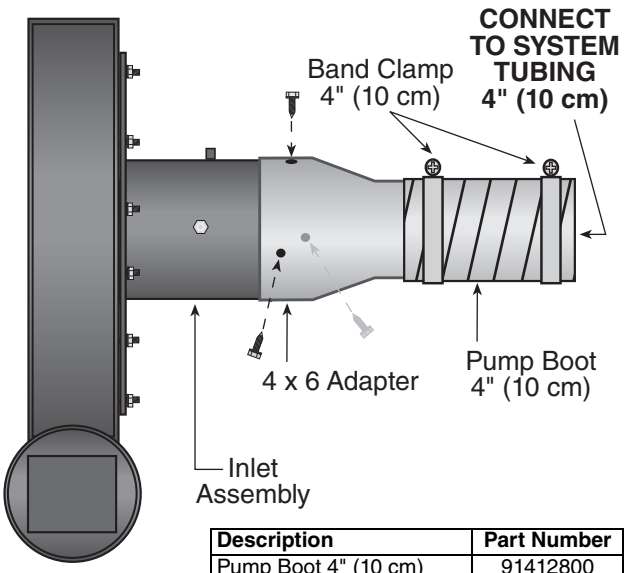
IMPORTANT: To prevent leakage of condensate, do not install screws at the 6 o'clock position.

Mount the pump boot to the inlet adapter using the band clamp provided. *See Page 12, Figure 6*.

5.2.2 Pump Inlet for 6" (15 cm) Tubing

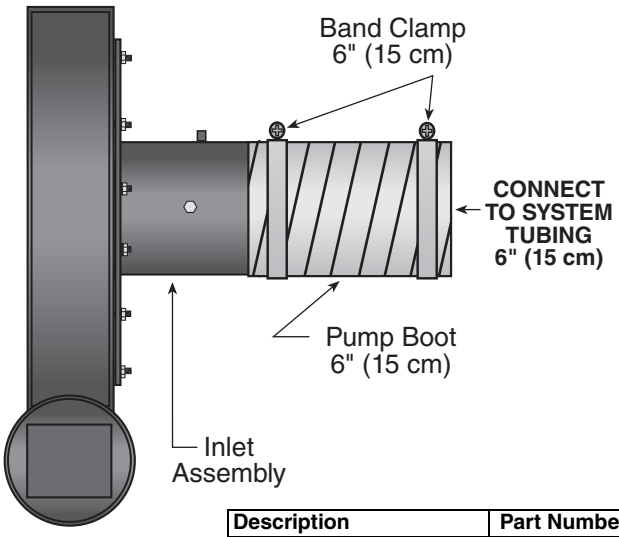
Attach 6" (15 cm) pump boot to the inlet *See Figure 7*, then *See Section 5.2.3*.

FIGURE 6: Pump Inlet Side 4"



Description	Part Number
Pump Boot 4" (10 cm)	91412800
Band Clamp 4" (10 cm)	91901300
Inlet Assembly	90713454
4x6 Adapter	02719903

FIGURE 7: Pump Inlet Side 6"

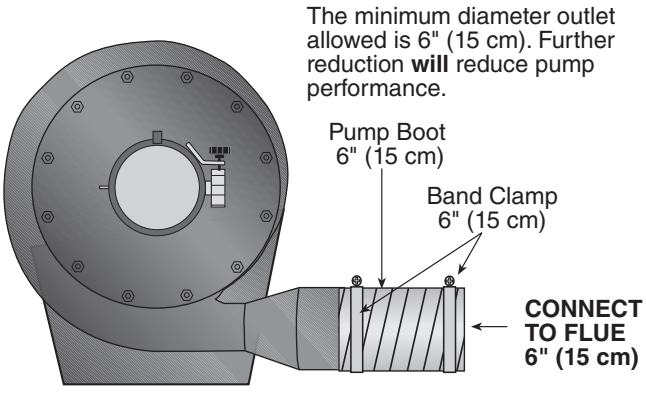


Description	Part Number
Pump Boot 6" (15 cm)	91412802
Band Clamp 6" (15 cm)	91913703
Inlet Assembly	90713451

5.2.3 Discharge Connection to 6" (15 cm) Flue

Mount the 6" (15 cm) pump boot to the pump outlet using the 6" (15 cm) band clamp provided. *See Page 13, Figure 8*.

FIGURE 8: Pump Discharge Side



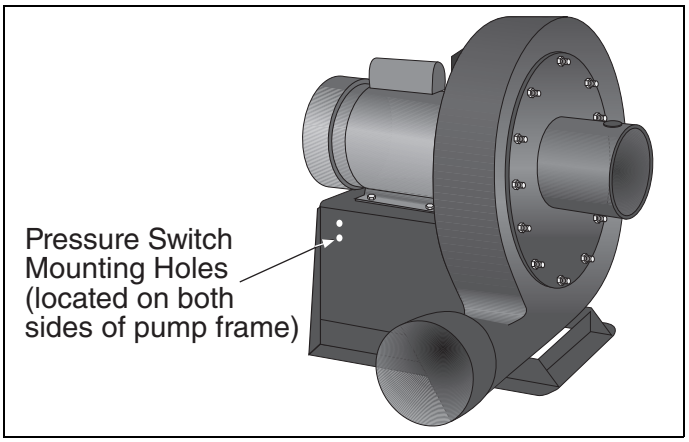
Description	Part Number
Pump Boot 6" (15 cm)	91412802
Band Clamp 6" (15 cm)	91913703

SECTION 6: PRESSURE SWITCH MOUNTING AND WIRING

6.1 Pressure Switch Installation

For connection to a pump, locate the two pressure switch mounting holes on the pump frame. If replacing an old pressure switch, you may need to drill two holes in the pump frame (7/32" dia. approximately 13/16" apart).

FIGURE 9: Pressure Switch Mounting Hole Location



6.1.1 Attaching Pressure Switch to Pump Inlet

Apply silicone sealant (600° F) to the threads of the pressure switch and then screw the pressure switch into the 1/8" NPT hole provided on the pump inlet. *See Page 11, Figure 4*. Care must be taken to make certain that the application of silicone does not plug the orifice hole of the pressure switch. Without pump verification, the system will not operate.

Using screws and locknuts included, mount the switch to the pump frame. Thread the barbed fitting into the threaded hole at the pump inlet. Cut the silicone tube to the appropriate length to eliminate the possibility of kinks and securely attach the hose to the pressure switch and the barbed fitting.

FIGURE 10: Mounted Pressure Switch

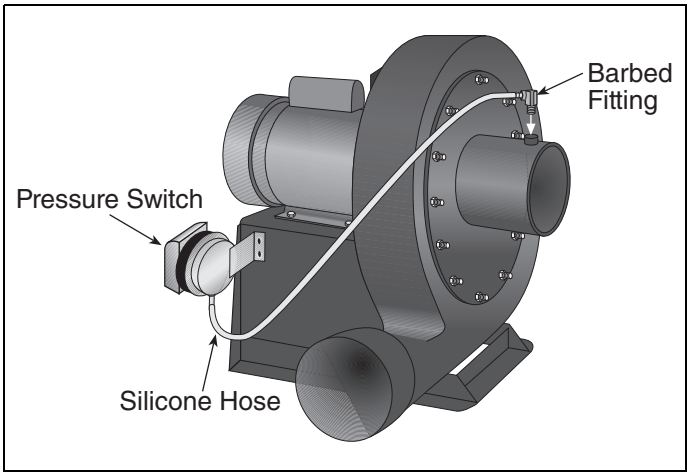
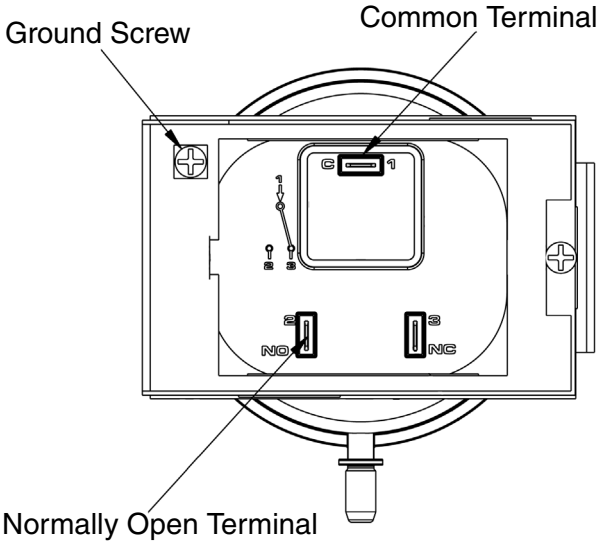


FIGURE 11: Wiring - Pump Pressure Switch ONLY



Connect the wire leads provided to terminals **1** and **2** labeled **(C)** Common and **(NO)** Normally Open. Refer to the pressure switch kit installation instructions or control panel installation instructions for connection to controls.

SECTION 7: PUMP MOUNTING INSTRUCTIONS

⚠ WARNING

Suspension Hazard

Mount pump with materials with a minimum working load of 750 lbs (340 kg).

Failure of the supports can result in death, injury or property damage.

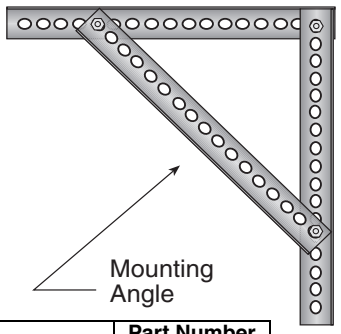
7.1 Mounting Platform

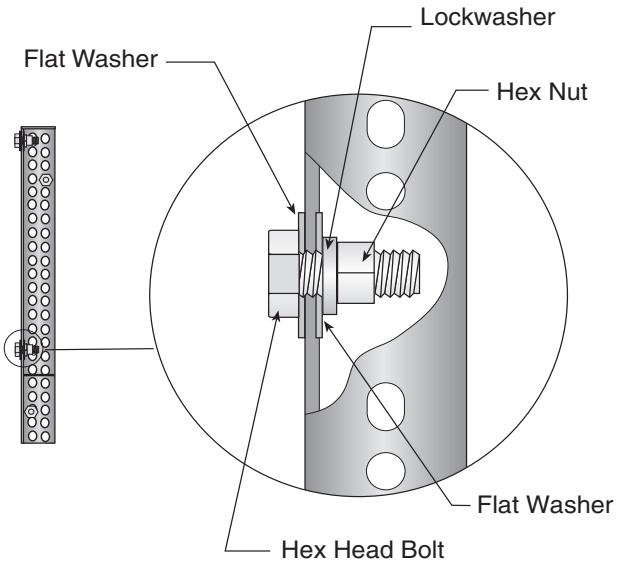
The standard method of mounting the pump is on an outside wall and venting directly through the wall.

The pump may be mounted by using mounting angles as shown in *Figure 12 and Figure 13*. The two mounting angles form a mounting platform to which the pump will be attached.

Fix the mounting frame to the wall using anchors. Select an anchor that will give equal to or greater than 2000 lbs ultimate pull-out strength.

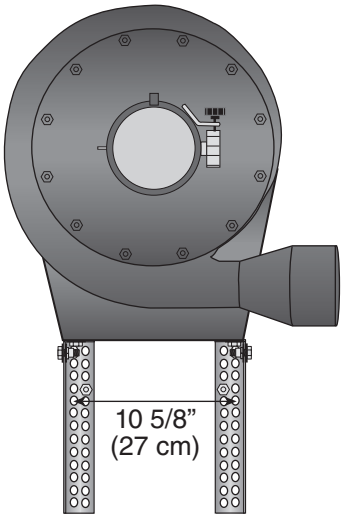
FIGURE 12: Wall Bracket Assembly

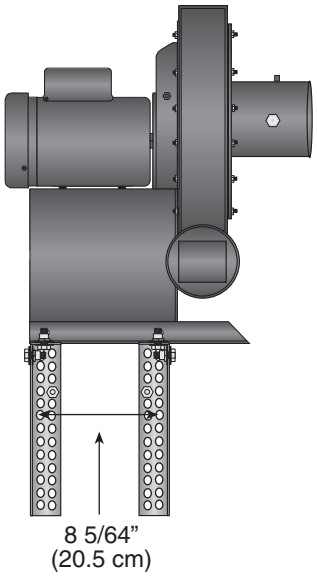




Description	Part Number
Mounting Angle	01365000
Hex Bolt 5/16" x 3/4"	93413912
Flat Washer	95211600
Lockwasher	96411600
Hex Nut	92113900

FIGURE 13: Mounting Platform Options





SECTION 8: MOTOR WIRING

⚠ WARNING

Electrical Shock Hazard

Disconnect electrical and gas before servicing.

This appliance must be connected to a properly grounded electrical source.

Failure to follow these instructions can result in death or electrical shock.

All wiring must comply with current wiring regulations and any local regulations which may apply. Always switch off the supply and disconnect before servicing.

8.1 Impeller Rotation Direction

Prior to operation of the pump in the heating system, operation and proper rotation of the impeller must be verified. See impeller rotation direction arrow label on the pump scroll for the correct rotation direction.

The motor must be wired for clockwise or counterclockwise rotation as shown *on Page 17, Figure 15 and Page 18, Figure 17*.

IMPORTANT: Improper rotation of the impeller will not produce the vacuum required for proper system operation.

8.2 EP-301 Wiring

The EP-301 motor is wired for 1 Ø, 230 V, 60 Hz operation.

When controlled by a system control, use Contactor Package 28A (P/N 10050012). *See Page 16, Figure 14*. See ROBERTS GORDON® System Control Manual (P/N 10091601NA) wiring details.

Wire the pressure switch per the heater Installation, Operation and Service Manual or appropriate controller installation manual.

Do not directly connect the controller relay terminals to the pump motor.

The power to the EP-301 pump is not supplied by the controller. Power is supplied by a separate circuit and is switched by the controller via a contactor with a 120 V AC coil. *See Page 16, Figure 14*.

FIGURE 14: EP-301 Contactor Wiring Diagram

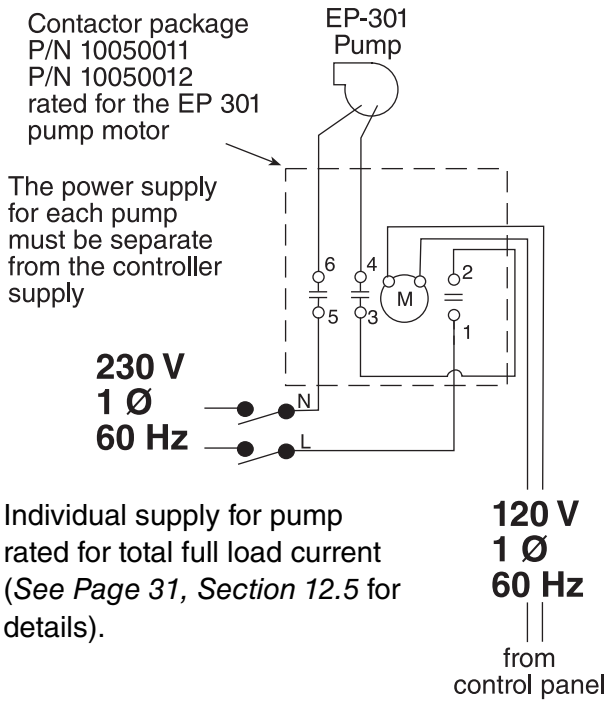
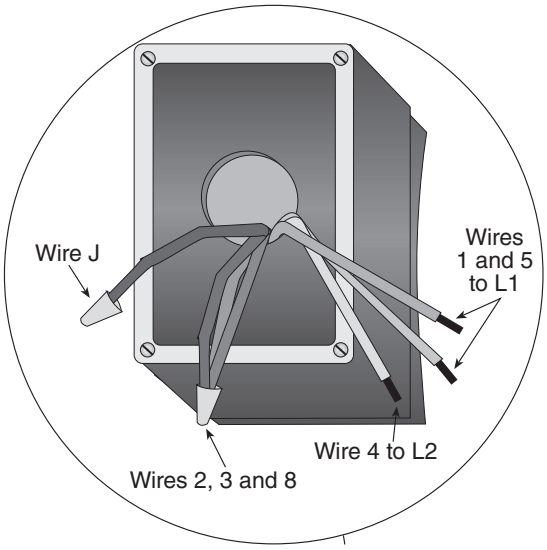
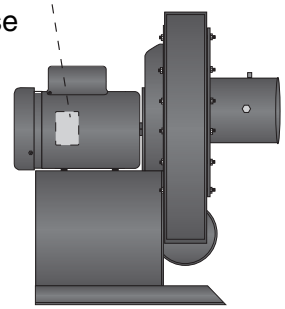


FIGURE 15: Motor Wiring for EP-301 Pump (Clockwise Impeller Rotation)



Note: Interchange wires 5 and 8 for counterclockwise rotation.



8.3 EP-303 Wiring

The EP-303 motor can be wired for 3 Ø, 208 V - 230 V/460 V, 60 Hz operation.

Do not directly connect the controller relay terminals to the pump motor.

When controlled by a system control, use Contactor Package 17A (P/N 10050011). *See Page 17, Figure 16*. See ROBERTS GORDON® System Control Manual (P/N 10091601NA) wiring details.

Wire the pressure switch per the appropriate wiring diagram in the Controller Installation Manual.

If using ROBERTS GORDON® ULTRAVAC™ controls, the power to the EP-303 pump is not supplied by the controller. Power is supplied by a separate circuit and is switched by the controller via the Variable Frequency Drive (VFD) 208 - 230 V only. See the ROBERTS GORDON® ULTRAVAC™ Installation Manual (P/N 10081601NA) for wiring details.

FIGURE 16: EP-303 208 V - 230 V (or 460 V) 3 Ø Pump Starter Wiring Diagram

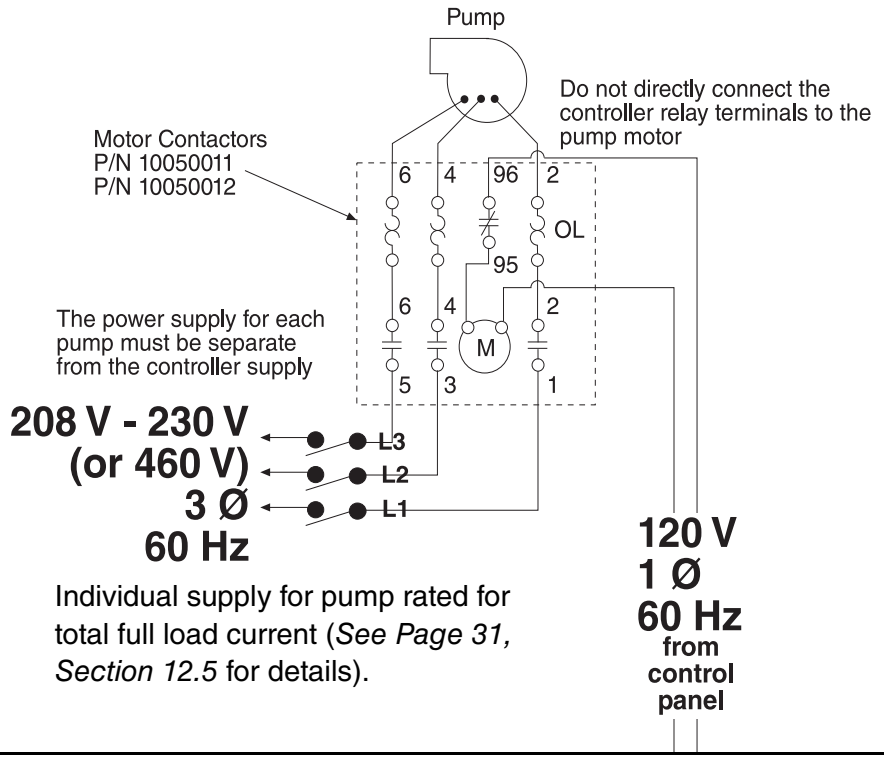
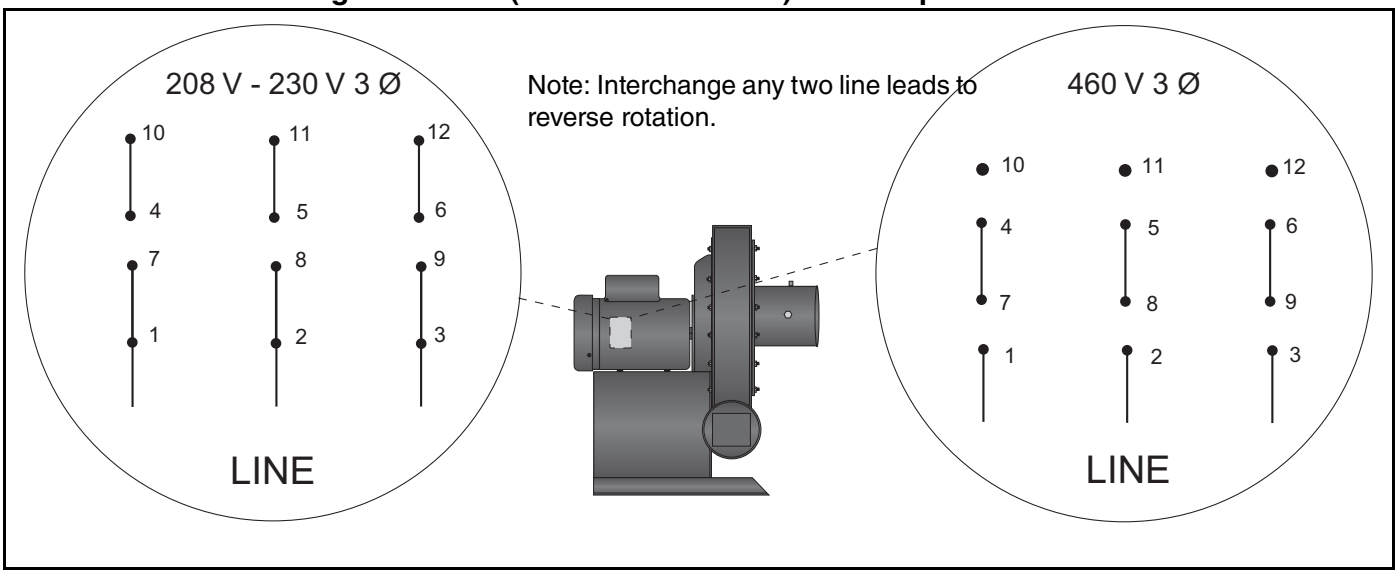


FIGURE 17: Motor Wiring for EP-303 (208 V - 230 V/460 V) 3 Ø Pump



SECTION 9: VENTING

⚠WARNING

Carbon Monoxide Hazard

Pump must be vented to the outside.

Heaters must be installed according to the installation manual.

Failure to follow these instructions can result in death or injury.

⚠WARNING

Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

9.1 Venting

This heater must be vented in accordance with the rules contained in this manual and with the following national codes and any state, provincial or local codes which may apply:

United States: Refer to National Fuel Gas Code NFPA 54/ANSI Z223.1 - latest revision.

Canada: Refer to Natural Gas and Propane Installation Code CSA B149.1 - latest revision.

This section provides partial information about this specification with regard to size and configuration for venting requirements. *See Page 20, Figure 18 and Page 21, Figure 19*. However, to provide assurance of proper and safe operation, it is the responsibility of the installer to make sure the installation is in strict accordance with all local and national codes.

9.2 Venting the Pump

- The exhaust connection from the pump is 6" (15 cm) diameter.
- Connect the 6" (15 cm) pump boot (provided) to the 6" (15 cm) flue pipe, using the 6" (15 cm) band clamp provided.
- Venting from the pump may discharge either horizontally or vertically. **Horizontal discharge is preferred.** *See Page 20, Figure 18*. Vertical discharge must be arranged as shown *on Page 21, Figure 19*. Corrosion resistant pipe is required.
- Both horizontal and vertical venting must be supported by suitable hangers.
- Vent lengths are allowed as follows:

VENT LENGTH	VENT SIZE
Up To 10' (3 m)	6" (15 cm) vent - 1 elbow
Up To 25' (8 m)	7" (18 cm) vent - 3 elbow
Up To 50' (15 m)	8" (20 cm) vent - 3 elbow

9.3 Vent Material Recomendations

Vent recommendations in order of preferred use:

1. Porcelain coated tubing 4" (10 cm) O.D. (P/N 9141030D)
2. Heat treated aluminized tubing 4" (10 cm) O.D. (P/N 91409408)
   Heat treated aluminized tubing 6" (15 cm) O.D. (P/N E0009105)
3. Single wall flue pipe - minimum 26 ga.
   (Not suitable for modulating and condensing system designs.)

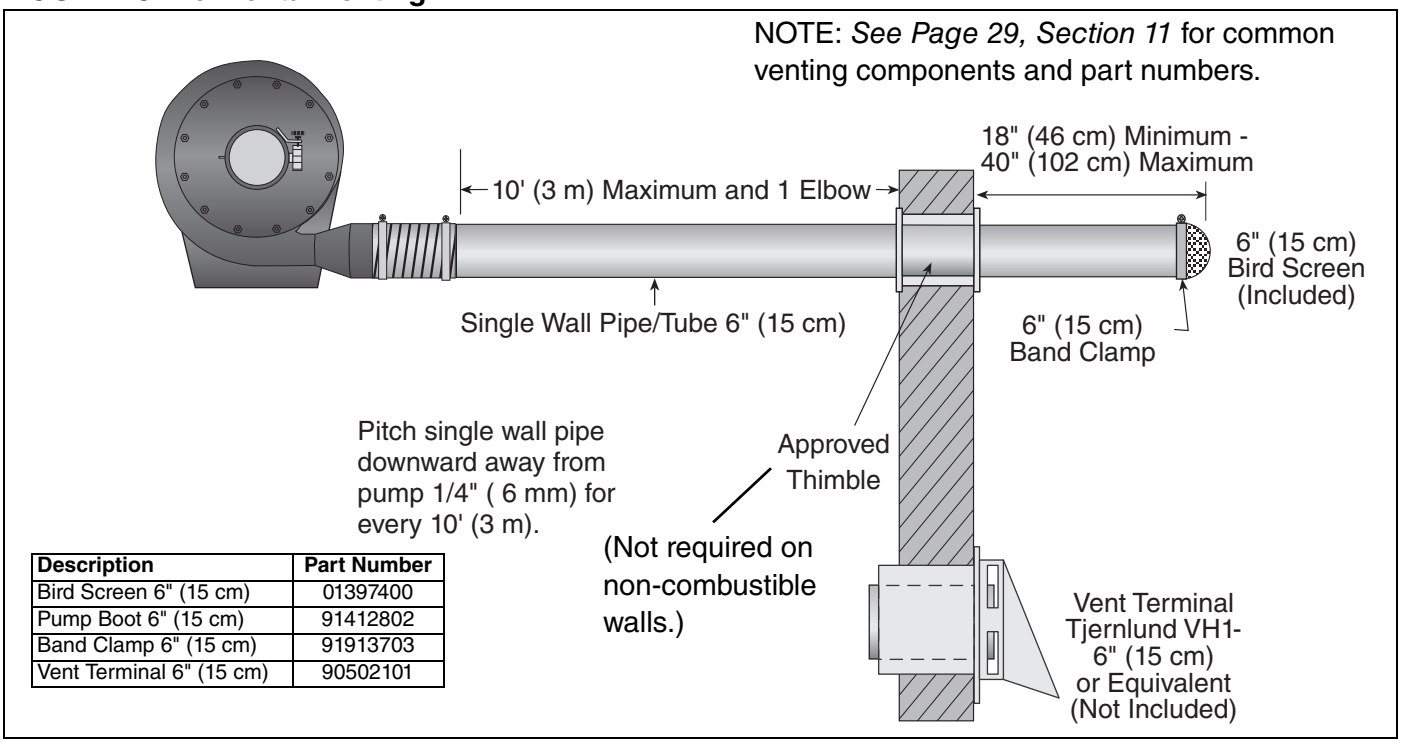
9.4 Horizontal Venting

If using vent lengths greater than 20' (6 m), condensation will form in the vent pipe. Insulation and additional sealing measures will be required.

- Vent must exit building not less than 7' (2 m) above grade when located adjacent to public walkways.
- Vent must terminate at least 3' (1 m) above any forced air inlet located within 10' (3 m).
- Vent must terminate at least 4' (1.2 m) below 4' (1.2 m) horizontally from or 12" (30 cm) above any door, window or gravity air inlet into building.

- Locate vent terminal at least 12" (30 cm) from any opening through which vent gases could enter a building.
- Use only corrosion resistant materials for the discharge line from the pump to the point of discharge.
- Vent terminal opening must extend beyond any combustible overhang.
- Install vent terminal at a height sufficient to prevent blockage by snow.
- Protect building materials from degradation by flue gases.
- Any portion of flue pipe passing through a combustible wall must be dual insulated and an approved thimble must be used.

FIGURE 18: Horizontal Venting


NOTE: See Page 29, Section 11 for common venting components and part numbers.
18" (46 cm) Minimum -
40" (102 cm) Maximum
10' (3 m) Maximum and 1 Elbow
6" (15 cm)
Bird Screen
(Included)
Single Wall Pipe/Tube 6" (15 cm)
6" (15 cm)
Band Clamp
Pitch single wall pipe downward away from pump 1/4" (6 mm) for every 10' (3 m).
Approved
Thimble
(Not required on non-combustible walls.)
Vent Terminal
Tjernlund VH1-
6" (15 cm)
or Equivalent
(Not Included)

Description	Part Number
Bird Screen 6" (15 cm)	01397400
Pump Boot 6" (15 cm)	91412802
Band Clamp 6" (15 cm)	91913703
Vent Terminal 6" (15 cm)	90502101

9.5 Vertical Venting

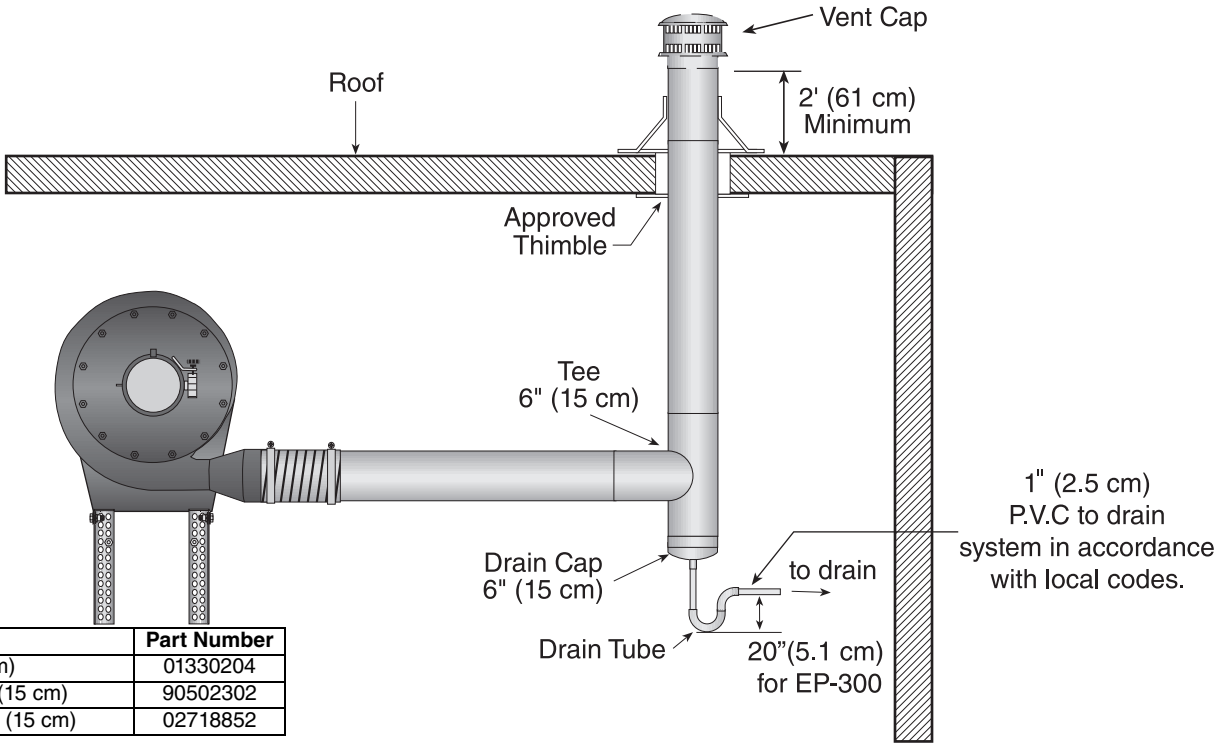
If using vent lengths greater than 20' (6 m), condensation will form in the vent pipe. Insulation and additional sealing measures will be required. Length of flue pipe is equal to total of vertical and horizontal length.

9.6 Venting Accessories

NOTE: 4" (10 cm) accessories may only be used on the inlet side of the EP-301 pump.

See Page 29, Section 11 for venting accessories.

FIGURE 19: Vertical Venting



Description	Part Number
Tee 6" (15 cm)	01330204
Vent Cap 6" (15 cm)	90502302
Drain Cap 6" (15 cm)	02718852

9.7 Condensate Tee Assembly

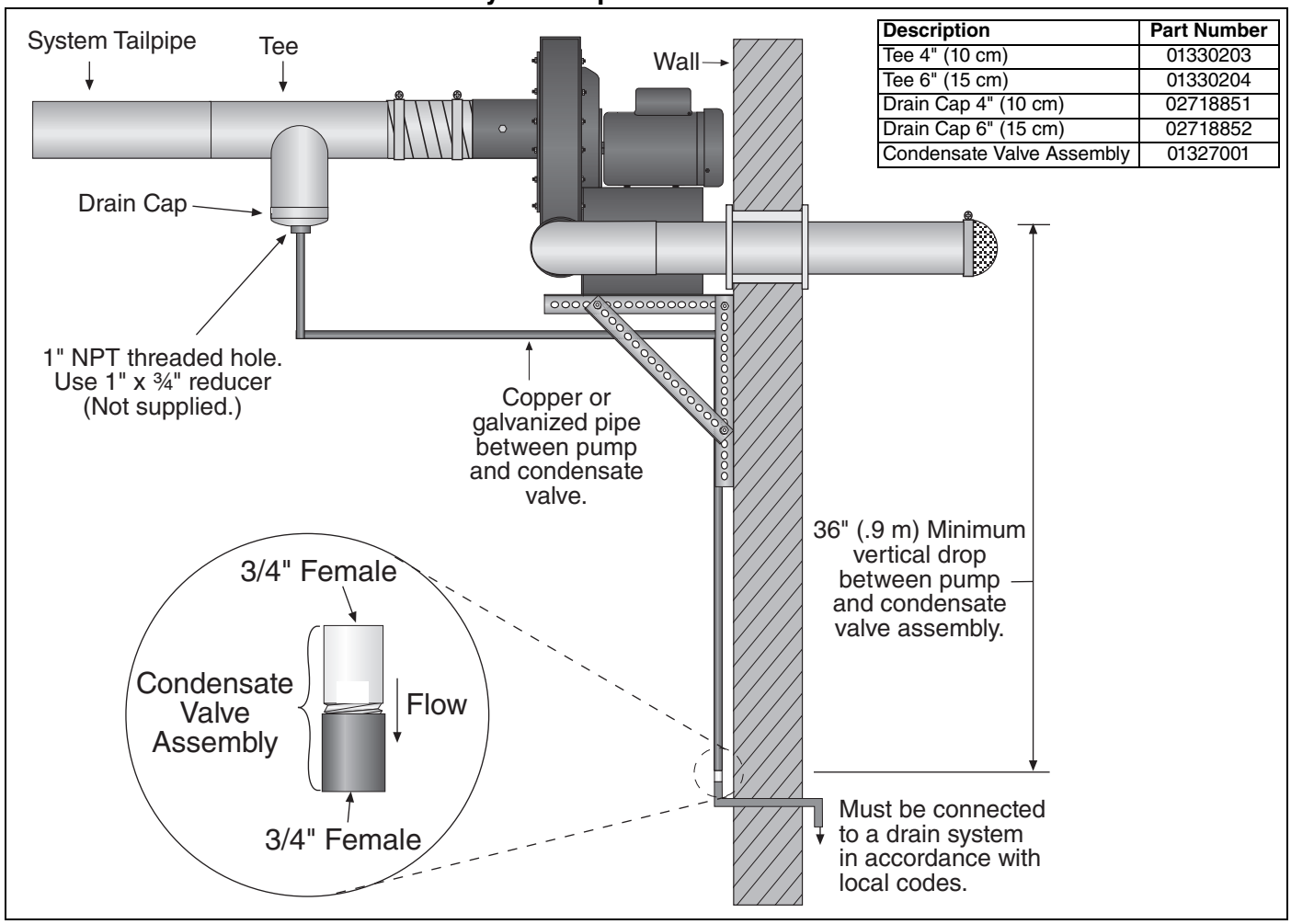
The condensate tee assembly is composed of a tee, draincap, and condensate trap.

If the system is designed in the condensing mode, then the installation of a condensate tee assembly is required. The condensate tee assembly, must be installed on the inlet side of the pump assembly if there is horizontal venting of the pump, *See Page 22, Figure 20*.

A condensate drain on the discharge side is required if there is vertical venting of the pump or if there is a vertical rise in the discharge line away from the pump. *See Page 22, Figure 21*.

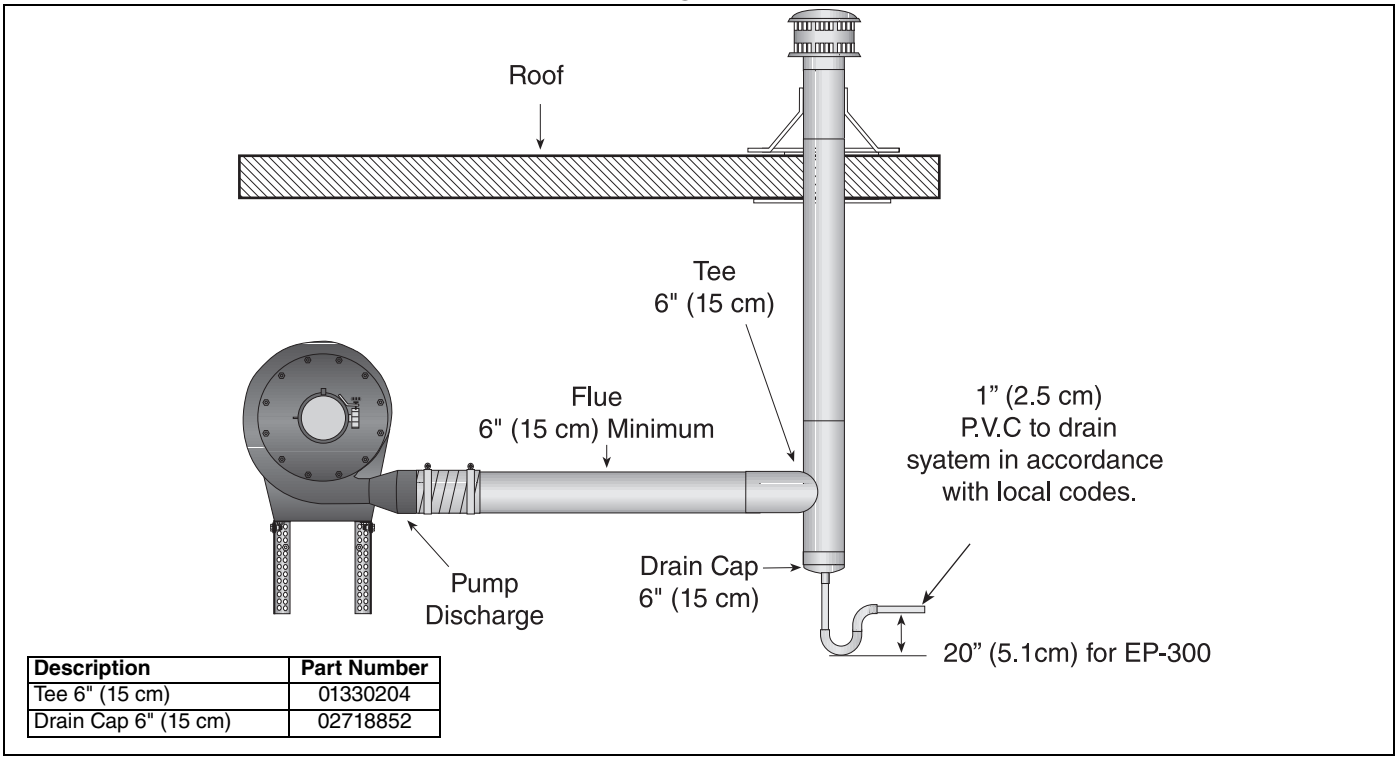
The condensate tee assembly in the discharge line can be eliminated if the discharge line is horizontal through the wall and pitched down at least 1/4" per 10' (6 mm per 3 m). This arrangement will permit drainage of condensate through the pump and outside via the horizontal (pitched) discharge line.

FIGURE 20: Condensate Tee Assembly at Pump Inlet



Description	Part Number
Tee 4" (10 cm)	01330203
Tee 6" (15 cm)	01330204
Drain Cap 4" (10 cm)	02718851
Drain Cap 6" (15 cm)	02718852
Condensate Valve Assembly	01327001

FIGURE 21: Condensate Drain for Vertical Venting



Description	Part Number
Tee 6" (15 cm)	01330204
Drain Cap 6" (15 cm)	02718852

FIGURE 22: Condensate Check Valve

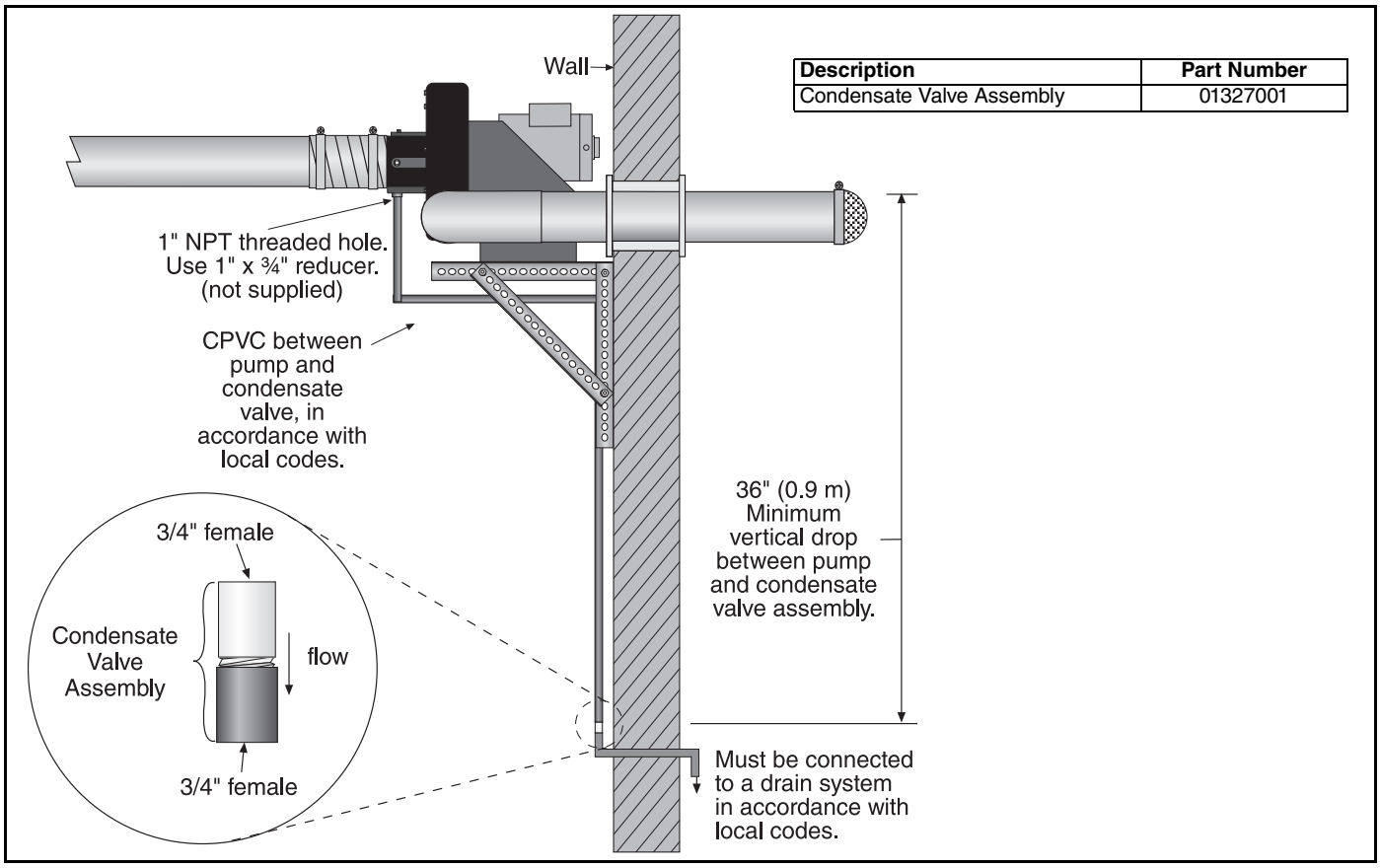
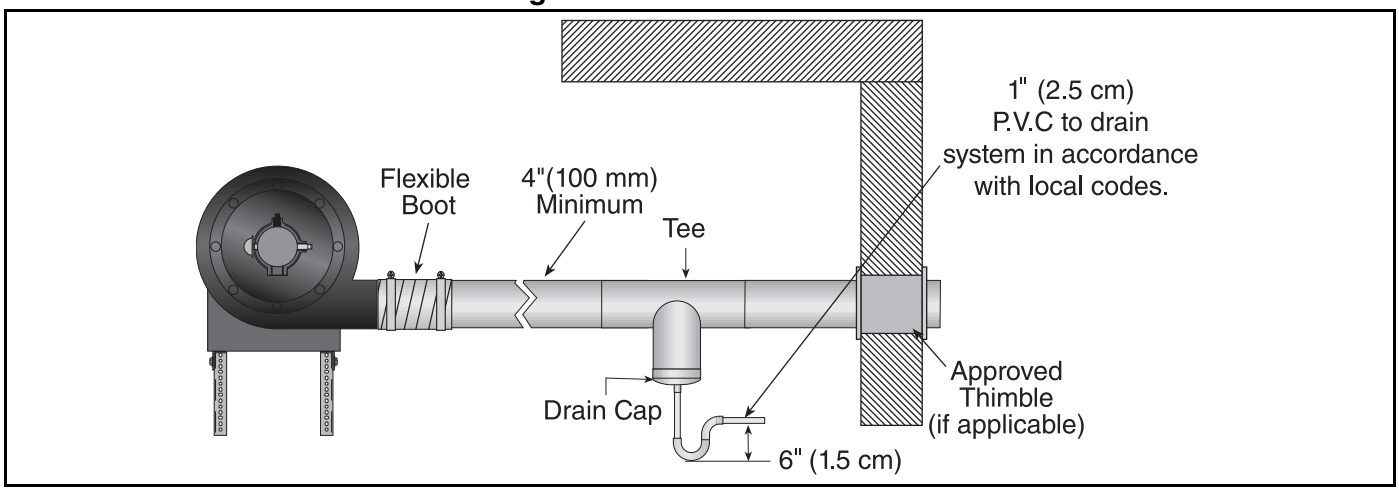

Wall
Description
Part Number
Condensate Valve Assembly
01327001
1" NPT threaded hole.
Use 1" x ¾" reducer.
(not supplied)
CPVC between pump and condensate valve, in accordance with local codes.
36" (0.9 m) Minimum vertical drop between pump and condensate valve assembly.
3/4" female
Condensate Valve Assembly
flow
3/4" female
Must be connected to a drain system in accordance with local codes.

FIGURE 23: Condensate Tee - Discharge Side



9.8 Condensate Trap and Condensate Tee

The condensate trap assembly (optional) (P/N 01327001), should be installed on the inlet side of the pump assembly, *See Page 23, Figure 22*.

It is possible to eliminate the condensate trap assembly on the pump if the one-inch threaded hole is plugged. This arrangement will permit drainage of condensate through the pump and outside via horizontal (pitched) discharge line.

The condensate trap assembly in the discharge line can be eliminated if the discharge line is horizontal through the wall and pitched down at least one inch per foot. A condensate trap on the discharge side is required if there is a vertical rise in the discharge line.

9.8.1 Condensate Neutralization Tube (optional)

If a condensate neutralization tube is specified to be used with the heating system, follow the steps below to choose the proper condensate neutralization tube. *See Page 25, Figure 24*.

Step 1: Condensate flow (gal/h) per 100,000 Btu/h installed

You will need to know the tailpipe length per flow unit and the total input (Btu/h) on the heating system. Please refer to the following chart to determine the condensate flow (gal/h) per 100,000 Btu/h installed:

Radiant Tube Length (average distance between burners)	**Tailpipe Length per Flow Unit**			
	Minimum	Recommended	1.7 ft/flow unit	Maximum
Minimum	N/A	0.1	0.3	0.6
Recommended	0.1	0.3	0.6	0.8
Maximum	0.3	0.6	0.8	0.8

Step 2: Total condensate

Determine the total condensate (gal/h) using the follow calculation:

Total condensate (gal/h) = Total Input (Btu/h) / 100,000 (Btu/h) x condensate flow (gal/h)

Step 3: Choose the condensate neutralization tube

Choose the condensate neutralization tube which is closest to and higher than the calculated gal/h value.

Calculated gal/h	**Description**	**Part Number**
Less than 2	Condensate Neutralization Tube 200	01327002
Less than 6	Condensate Neutralization Tube 600	01327003
Less than 10	Condensate Neutralization Tube 1000	01327004
Less than 20	Condensate Neutralization Tube 2000	01327005

Example:

CORAYVAC® system has a total input of 600,000 Btu/h. The radiant tube length and tailpipe are set-up according to the RECOMMENDED specifications.

Step 1: Condensate flow (gal/h) per 100,000 Btu/h installed

Select 0.3 from the Condensate flow chart.

Radiant Tube Length (average distance between burners)	**Tailpipe Length per Flow Unit**			
	Minimum	**Recommended**	1.7 ft/flow unit	Maximum
Minimum	N/A	0.1	0.3	0.6
Recommended	0.1	**0.3**	0.6	0.8
Maximum	0.3	0.6	0.8	0.8

Step 2: Total condensate

Multiply the total input Btu/h / 100,000 by the condensate flow (gal/h) per 100,000 (Btu/h) (600,000/100,000) x 0.3 = 1.8 (gal/h)

Step 3: Choose the condensate neutralization tube

Choose the condensate neutralization tube which is closest to and higher than the calculated gal/h value. For this example, the total condensate is 1.8 (gal/h), the condensate neutralization tube which is closest to and higher than the calculated gal/h value is P/N 01327002.

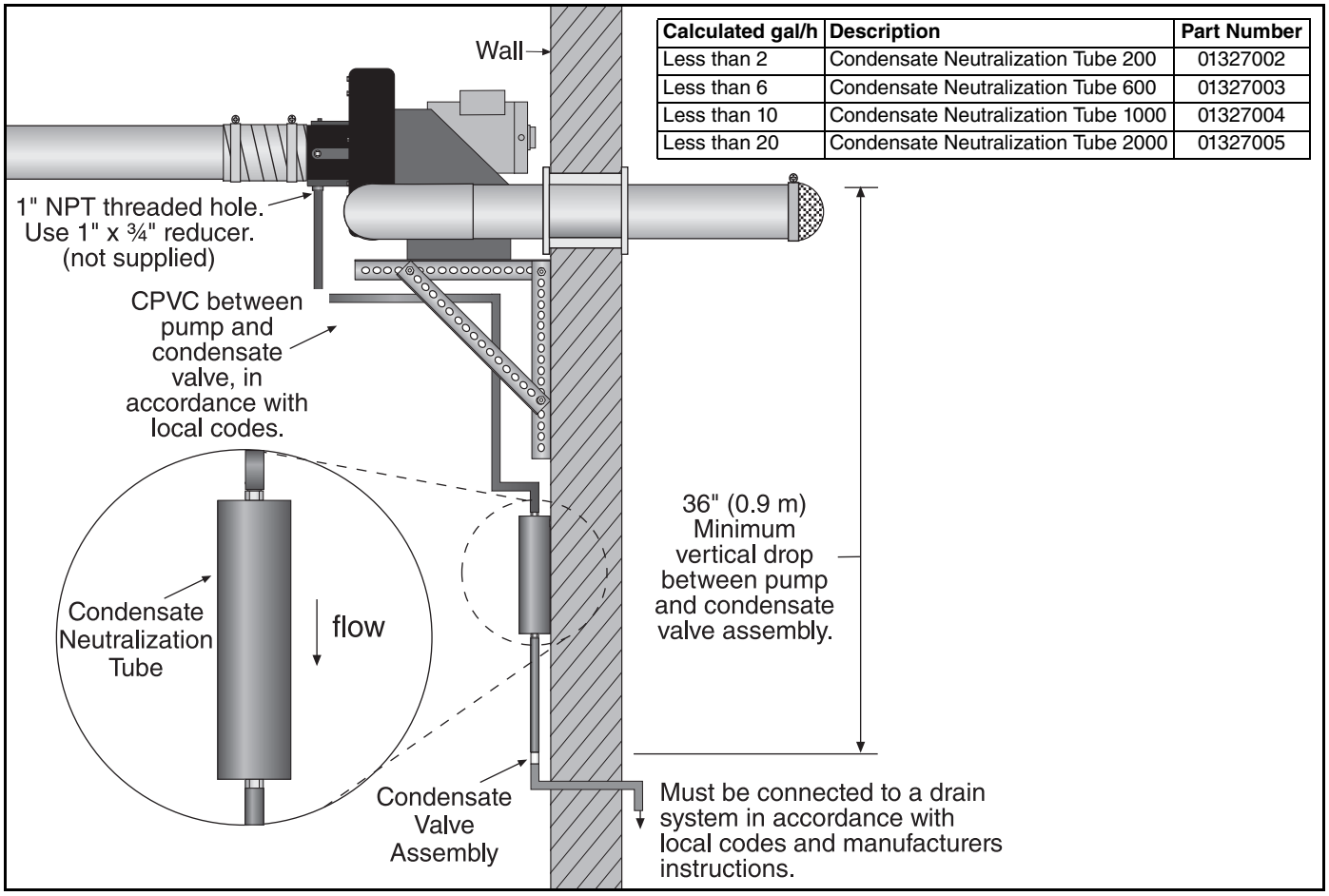
Calculated gal/h	**Description**	**Part Number**
Less than 2	**Condensate Neutralization Tube 200**	**01327002**
Less than 6	Condensate Neutralization Tube 600	01327003
Less than 10	Condensate Neutralization Tube 1000	01327004
Less than 20	Condensate Neutralization Tube 2000	01327005

NOTE: Condensate neutralization tubes must be replaced yearly (every 2000 operating hours) or check condensate water pH level. If it is below pH 6, replace tube.

To order replacement, see the chart below:

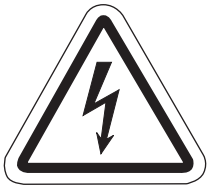
Description	**Part Number**
Condensate Neutralization Tube 200	01327002
Condensate Neutralization Tube 600	01327003
Condensate Neutralization Tube 1000	01327004
Condensate Neutralization Tube 2000	01327005
Refill, Condensate Neutralization Tube 600	01327007
Refill, Condensate Neutralization Tube 1000	01327008
Refill, Condensate Neutralization Tube 2000	01327009

FIGURE 24: Condensate Neutralization Tube



Calculated gal/h	Description	Part Number
Less than 2	Condensate Neutralization Tube 200	01327002
Less than 6	Condensate Neutralization Tube 600	01327003
Less than 10	Condensate Neutralization Tube 1000	01327004
Less than 20	Condensate Neutralization Tube 2000	01327005

SECTION 10: SERVICING INSTRUCTIONS

⚠ DANGER	⚠ WARNING		
			
Electrical Shock Hazard **Disconnect electric before service.** **Heater and pump must be connected to a properly grounded electrical source.**	**Explosion Hazard** **Turn off gas supply to heater before service.**	**Burn Hazard** **Allow heater and pump to cool before service.** **Tubing may still be hot after operation.**	**Cut/Pinch Hazard** **Wear protective gear during installation, operation and service.** **Edges are sharp.**
Failure to follow these instructions can result in death, electric shock, injury or property damage.			

⚠ DANGER
Severe Injury Hazard **Install pump scroll and inlet assembly before operating high speed rotating impeller.** **Keep hands, fingers and clothing away from inlet and outlet.** **Install and operate equipment according to installation manual.** **Failure to follow these instructions can result in death or severe injury.**

Disassembly and removal or replacement of any pump components must be done by a service contractor or electrician qualified in the installation and service of gas-fired heating equipment.

Overtorquing can result in a failure of components.

Failure to follow these instructions can compromise pump operation and void warranty.

10.1 Pre-Season Maintenance and Annual Inspection

To ensure your safety and years of trouble-free operation of the pump, service and annual inspections must be done by a contractor qualified in the installation and service of gas-fired heating equipment.

Disconnect electric and gas supplies before performing service or maintenance.

Before every heating season, a contractor qualified in the installation and service of gas-fired heating equipment must perform a thorough safety inspection of the pump.

For safety and best performance, the electrical, venting, suspensions and overall pump condition are some of the areas requiring inspection.

Please *see Page 28, Section 10.3* for suggested items to inspect.

10.2 To Change the Motor and/or the Impeller

1. Disconnect electrical power before servicing.
2. Remove the pump boots from the inlet and outlet of the scroll assembly, disconnecting the pump from tailpipe and vent pipe.
3. To remove the motor or impeller, the scroll must be opened. Remove the twelve nuts on the motor side of the pump frame.
4. Remove the scroll assembly and inlet assembly from the frame as one piece.
5. The impeller can be removed by loosening the four set screws in the cooling disc, then removing the hex head bolt (M8 x 1 x 50) and washer

from the end of the motor shaft. With an appropriate wheel puller, remove the impeller.

6. The motor can now be removed, if necessary, by removing the attachment hardware.
7. Re-assembly of motor/impeller combination requires proper alignment. Be certain of proper motor alignment and free rotation.
8. The four set screws should be reinstalled with a drop of thread locking sealant and remain unseated during initial re-assembly.
9. Slide the impeller onto the motor shaft end. Apply a drop of thread locking sealant to the threads of the hex head bolt. Slide the washer onto the hex head bolt and thread the bolt into the shaft so that it bottoms on the end of the shaft and hub of the impeller. Torque to 120 in/lbs.
10. Seat the four set screws. Torque to 140 in/lbs.
11. Re-attach the scroll and tighten the twelve nuts.

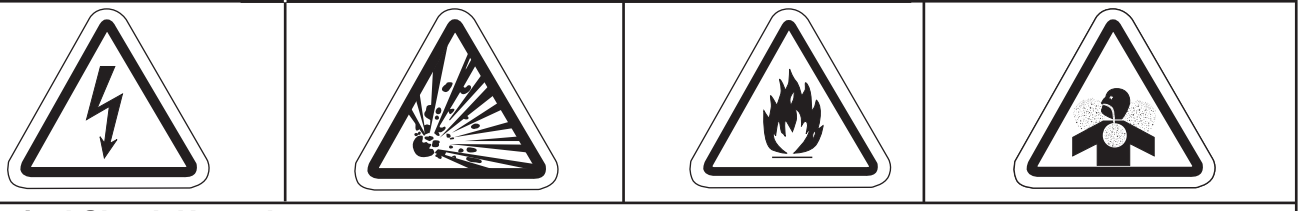
10.3 Maintenance Checklist

Installation Code and Annual Inspections:
All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon LLC and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment.To help facilitate optimum performance and safety, Roberts-Gordon LLC recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplies by Roberts-Gordon LLC.

System Tubing and Vent Pipe	Venting must be intact. Using a flashlight, look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.
	The area must be free of dirt and dust or blockage.
	Remove any carbon deposits or scale using a wire brush.
	Replace pipe if there are any holes due to corrosion. Seal any gaps in venting to prevent condensate leakage.
Pump Scroll, Impeller and Motor	Compressed air or a vacuum cleaner may be used to clean dust and dirt.
	Check for corrosion, if any parts have corroded through, replace as necessary.
	Ensure all M8 nuts are tight for proper seal.
Suspension Points	Make sure the pump is hanging securely.
	Look for signs of wear on the mounting angles, wall mounting points or ceiling mounting points.
Pump Boot	Inspect pump boot at pump inlet and outlet for cracking or deterioration.
	Replace if cracks are found.
	Ensure band clamps are tight at all connection points.
Condensate Trap, Drain Cap	Check connection of tee to drain cap and between tee and condensate trap.
	Seal connections between tee and drain cap to prevent condensate leakage.
	Screw condensate trap tightly into drain cap to prevent leakage.
	Condensate trap should be filled with water.
Pressure Switch	Ensure that wiring is intact. Check silicone hose for cracks.
	Ensure secure connection between pressure switch and barbed fitting.
Safety Labels	Product safety signs or labels should be replaced by the product user when they are no longer legible. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor to obtain replacement signs or labels. *See Page 2, Figure 1*.

SECTION 11: REPLACEMENT PARTS AND ACCESSORIES

⚠ DANGER **⚠ WARNING**



Electrical Shock Hazard **Explosion Hazard** **Fire Hazard** **Carbon Monoxide Hazard**

Use only genuine ROBERTS GORDON® replacement parts per this installation, operation and service manual.

Failure to follow these instructions can result in death, electric shock, injury or property damage.

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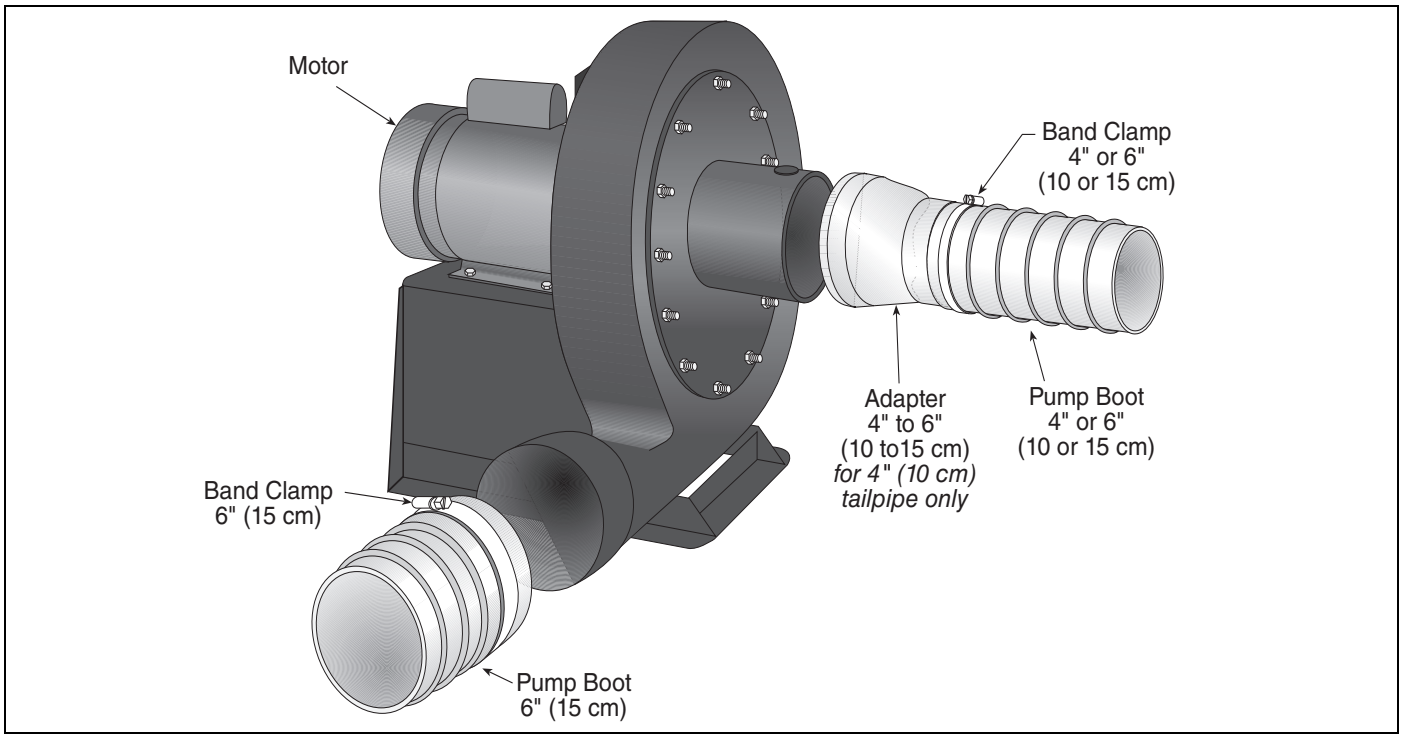


11.1 Replacement Parts

Description	Part Number
Motor 2 HP, 230 V, 1 Ø	90605102
Motor 2 HP, 208 V - 230 V/460 V, 3 Ø	90605103
Impeller Assembly, 340 mm dia.	90713340
4" (10 cm) Band Clamp	91901300
6" (15 cm) Band Clamp	91913703
Pressure Switch	90430600K
Pump Scroll Assembly	90713451

Description	Part Number
Isolator Pads	T00680
4" (10 cm) Pump Boot	91412800
6" (15 cm) Pump Boot	91412802
Mounting Angle	01365000
Adapter 6" x 4" (15 cm x 10 cm)	02719903
Bird Screen with Clamp	01397400
Pump Inlet Assembly	90713454

11.2 Accessories

Description	Part Number
Contactor Package (for EP-301)	10050009
Starter Package (for EP-303)	10050010
4" Plain Coupling	01312700
6" Plain Coupling	01312706
4" Lined Coupling	0131270I

Description	Part Number
Aluminized Tube adapter (6" dia. x 4" dia.)	91418200
6" Tube Hangar	91240010
4" Drain Cap	02718851
6" Drain Cap	02718852
Condensate Valve Assembly	01327001

Description	Part Number
4" Damper Coupling	01331900
6" Damper Coupling	E0009356
4" Aluminized Tee	01330203
6" Aluminized Tee	01330204
4" Coated Tee	0133022D
4" Aluminized Cross	01330903

Description	Part Number
6" Aluminized Cross	01330904
4" Coated Cross	0133092D
4" Aluminized 90° Elbow	01335801
6" Aluminized 90° Elbow	T0100320
4" Coated 90° Elbow	0133580D

SECTION 12: SPECIFICATIONS

12.1 Material Specifications

12.1.1 Pump Frame, Inlet, Scroll and Impeller

3 mm welded steel construction

12.1.2 Pump Weight

170 lbs (78 kg)

12.2 EP-301 Controls Specifications

Motor controls and contactors are sold separately. Use contactor package.

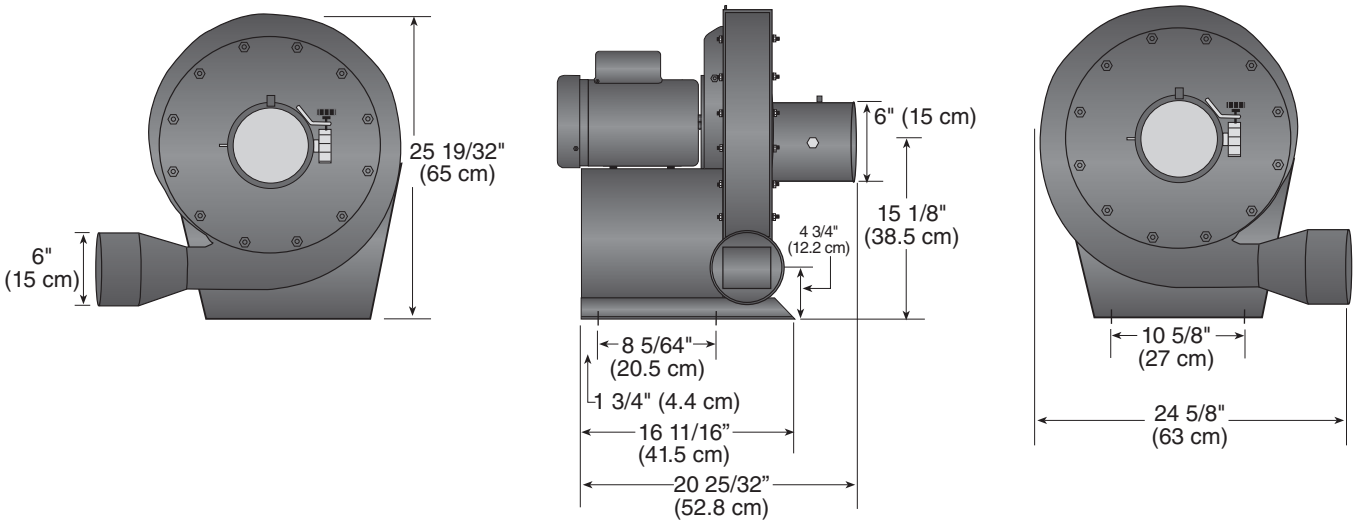
12.3 EP-303 Controls Specifications

Motor starters are sold separately.

When using a System Control, use Starter Package P/N 10050010.

With ROBERTS GORDON® ULTRAVAC™, use variable frequency drive (P/N VFD20230), sold separately.

12.4 General Dimension Specifications



12.5 Pump Specifications

Model	EP-301	EP-303
Horsepower (Hp)	2	2
Phase (Ø)	1	3
Hertz (Hz)	60	60
Voltage (V)	208/230	208 -230 / 460
Full Load Amp (A)	12.8 - 11.5	5.5 - 5.2 / 2.6
R.P.M.	3450	3450
Motor Frame	90	90
Motor Enclosure	TEFC	TEFC
Noise Level @ 5' dB(A)	N/A	N/A
Inlet/Outlet (In.)	6	6
Weight (lbs.)	170	170

SECTION 13: THE ROBERTS GORDON® EP-300 SERIES PUMP WARRANTY

ROBERTS-GORDON LLC WILL PAY FOR:

Within 36 months from date of purchase by buyer or 42 months from date of shipment by Roberts-Gordon LLC (whichever occurs first), replacement parts will be provided free of charge for any part of the product which fails due to a manufacturing or material defect.

Roberts-Gordon LLC will require the part in question to be returned to the factory. Roberts-Gordon LLC will, at its sole discretion, repair or replace after determining the nature of the defect and disposition of part in question.

ROBERTS GORDON® Replacement Parts are warranted for a period of 12 months from date of shipment from Roberts-Gordon LLC or the remaining ROBERTS GORDON® EP-300 Series Pump warranty.

ROBERTS-GORDON LLC WILL NOT PAY FOR:

Service trips, service calls and labor charges.

Shipment of replacement parts.

Claims where the total price of the goods have not been paid.

Damage due to:

- Improper installation, operation or maintenance.
- Misuse, abuse, neglect, or modification of the ROBERTS GORDON® EP-300 Series Pump in any way.
- Use of the ROBERTS GORDON® EP-300 Series Pump for other than its intended purpose.
- Incorrect gas or electrical supply, accident, fire, floods, acts of God, war, terrorism, or other casualty.
- Improper service, use of replacement parts or accessories not specified by Roberts-Gordon.
- Failure to install or maintain the ROBERTS GORDON® EP-300 Series Pump as directed in the Installation, Operation and Service Manual.
- Relocation of the ROBERTS GORDON® EP-300 Series Pump after initial installation
- Use of the ROBERTS GORDON® EP-300 Series Pump in a corrosive atmosphere containing contaminants.
- Use of the ROBERTS GORDON® EP-300 Series Pump in the vicinity of a combustible or explosive material.
- Any defect in the ROBERTS GORDON® EP-300 Series Pump arising from a drawing, design, or specification supplied by or on behalf of the consumer.
- Damage incurred during shipment. Claim must be filed with carrier.

WARRANTY IS VOID IF:

The ROBERTS GORDON® EP-300 Series Pump is not installed by an contractor qualified in the installation and service of gas fired heating equipment.

You cannot prove original purchase date and required annual maintenance history.

The data plate and/or serial number are removed, defaced, modified or altered in any way.

The ownership of the ROBERTS GORDON® EP-300 Series Pump is moved or transferred. This warranty is non-transferable.

Roberts-Gordon LLC is not permitted to inspect the damaged equipment and/or component parts.

READ YOUR INSTALLATION, OPERATION AND SERVICE MANUAL.

If you have questions about your equipment, contact your installing professional. Should you need Replacement Parts or have additional questions, call or write:

Roberts-Gordon LLC
1250 William Street
P.O. Box 44
Buffalo, New York 14240-0044
Telephone: +1.716.852.4400
Fax: +1.716.852.0854
Toll Free: 800.828.7450
www.rg-inc.com
www.radiantheaters.com
www.robertsgordon.com
www.corayvac.com

Roberts-Gordon LLC's liability, and your exclusive remedy, under this warranty or any implied warranty (including the implied warranties of merchantability and fitness for a particular purpose) is limited to providing replacement parts during the term of this warranty. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you. There are no rights, warranties or conditions, expressed or implied, statutory or otherwise, other than those contained in this warranty.

Roberts-Gordon LLC shall in no event be responsible for incidental or consequential damages or incur liability for damages in excess of the amount paid by you for the ROBERTS GORDON® EP-300 Series Pump**.** Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

Roberts-Gordon LLC shall not be responsible for failure to perform under the terms of this warranty if caused by circumstances out of its control, including but not limited to war, fire, flood, strike, government or court orders, acts of God, terrorism, unavailability of supplies, parts or power. No person is authorized to assume for Roberts-Gordon LLC any other warranty, obligation or liability.

LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:

No representative of Roberts-Gordon LLC, other than an Executive Officer, has authority to change or extend these provisions. Changes or extensions shall be binding only if confirmed in writing by Roberts-Gordon LLC's duly authorized Executive Officer.